D. FOLSOM

American Potato Journal

Published Monthly by

The Potato Association of America

"Entered as second-class matter May 31, 1924, at the post office at Washington, D. C., under the Act of March 3, 1879."

SUBSCRIPTION PRICE $1.00 PER YEAR

VOL. IV. NO. 4 APRIL, 1927

SF 826

EFFECT OF FERTILIZER ON POTATO TUBERS

B. E. Brown, Washington, D. C.

In November, of last year, Professor Wm. Stuart referred a letter to the writer which he had received from Prof. Charles Gregory of Purdue University, Lafayette, Indiana. Prof. Gregory's letter was to the effect that some potatoes had been brought to his attention which were affected in a curious way.

The outer quarter inch of the potatoes was bitter, the interior being normal. The trouble was not due to sunburn. The potatoes had been dug while the ground was wet, causing the lenticels to become large and protruding. In some cases the cortex of the potatoes was yellow and it was this part that was exceedingly bitter. The potatoes which were affected were stored in fertilizer sacks which had held 0-12-6 mixture. Professor Gregory's informant advised him that the potatoes not stored in such sacks were not affected with the bitterness in any way and that the bitterness was not dissipated in cooking.

The writer would assume that such effects were due to the fertilizer salts. The occasional sprout injury due to fertilizer concentration near the seed piece is probably related to what Professor Gregory had brought to his attention. Potato growers are careful to put fertilizer sacks on the "wash line" and let the rain free them of soluble salts. The writer has had an occasional inquiry concerning alleged injury to sacked potatoes shipped in railroad cars previously containing fertilizer. The question of whether injury results to potatoes from fertilizer is well answered by the work of Prof. D. J. Macleod, Canada, Experiment Farms, given in the 1925 Report, Division of Botany, pp. 48-50, an abstract of which appears in the November, 1926, issue of the American Potato Journal, page 368.

The test made by us involved simply using a 0-12-6 mixture of acid phosphate and sulphate of potash and comparing its effect on Green Mountain potatoes with potatoes not in contact with the fertilizer.

Lots of twelve tubers for each treatment were selected and given the following treatment:

Bag No. 1	Dry potatoes	No fertilizer	Dry bag
Bag No. 2	Dry potatoes	With fertilizer	Dry bag
Bag No. 3	Wet potatoes	No fertilizer	Dry bag
Bag No. 4	Wet potatoes	With fertilizer	Dry bag
Bag No. 5	Wet potatoes	No fertilizer	Wet bag
Bag No. 6	Wet potatoes	With fertilizer	Wet bag
Bag No. 7	Wet potatoes	Rolled in fertilizer	Dry bag

The potatoes designated "Wet" were allowed to soak in water for two hours. The 0-12-6 fertilizer was put in bags which were either dry or wet and shaken around thoroughly. By shaking out the fertilizer not held by the bag it was thought a practical comparison might be secured with the other treatments. The bags were kept in the fertilizer house on the cement floor.

The test was started on November 26. On December 3 an examination of the tubers did not show any abnormal effects, either as to color or taste. On December 20, the potatoes in bags 6 and 7, especially the former, were markedly affected. A superficial yellowish gray color and a bitter taste developed which largely persisted after boiling the potatoes. A distinct softening of the outer tissue was manifest, more marked in the case of the potatoes in bag 6 and those in bag 7. Dead tissue areas, chiefly around the lenticels, were noticeable, the tissue in such cases being somewhat dry. An examination of the potatoes in bags 1, 2 and 3 failed to disclose other than normal characteristics. The potatoes in bag 4 showed no ill effects except an occasional tuber with a little softer tissue than normal. Those in bag 5 appeared softer than the normal tubers.

As pointed out the combination of wet potatoes, contact with fertilizer and wet bags, as provided by bag No. 6, proved the most injurious: Rolling the wet potatoes in the fertilizer and storing in a dry bag was next in causing injury. The chief precaution to observe to prevent such injury would be to clean the fertilizer bags thoroughly before storing potatoes in them. No doubt the most economical method would be to do what the grower usually does, namely, throw the bags over the fence and let the rain wash out the fertilizer salts.

ABSTRACTS FROM THE PROCEEDINGS
of the
Thirteenth Annual Meeting of The Potato Association of America

THE OCCURRENCE OF SPROUT TUBERS AND SOME FACTORS RELATING TO THEIR DEVELOPMENT

Freeman Weiss and Philip Brierley

Sprout tubers are new potatoes formed direct from the seed piece before the leafy stalks have developed. Green sprouts may

come later, either from the seed piece or from the sprout tuber. In the field, sprout tubers mean misses or weak hills. Their occurrence does not necessarily mean the seed stock is infected with virus disease. They can be produced experimentally when healthy potatoes that have been stored in a warm place (60 degrees F.) have the sprouts removed once or twice and are planted in very dry, cool soil (50 degrees F. or lower.) Normal cool storage and planting in warm, moist soil make for normal sprouting. A tendency to abnormal sprouting developed previous to planting may persist in good planting conditions. Sprout tubers do not often appear under American storage and planting practices. It is suggested but not shown that the occurrences on record in this country are due to heat or drought effects on the seed stock before harvest.

ARE SEED POTATOES INJURED BY FREEZING SUITABLE FOR PLANTING?

R. C. Wright, Associate Physiologist, and W. M. Peacock, Associate Horticulturist, Horticulture, Bureau of Plant Industry

Seed potatoes frozen under control conditions and classified according to the degree of injury when planted in the field gave the following results: those classed as bad did not give a satisfactory germination or yield per acre. Those showing only slight injury gave a varying germination and yield from rather low to almost as good as the checks. Those potatoes subjected to the same freezing temperature but showing no physical signs of injury gave practically as good results as the checks, in some showing apparent increased vitality.

CROP AND MARKET NEWS

GROWERS REPORT INTENTIONS TO PLANT MARKETS UNSETTLED

(Contribution from the Fruit and Vegetable Division, Bureau of Agricultural Economics, U. S. Department of Agriculture)

The scenes have shifted again. Except in the far West, price gains of early March were largely lost by the first week of April. Idaho Russet Burbanks had advanced about 40 cents per 100 pounds at shipping point and in mid-western markets. But the Aroostook County price of bulk Maine Green Mountains declined 30 cents, and important eastern distributing centers quoted these potatoes and eastern Round Whites about 25 cents below the early-March level. Evidently, the rumors of approaching shortage in northern Maine were not well founded; at least, the shipping-point

market was rather weak, compared with the southern Idaho situation.

Most other potatoes declined after the heavy shipments of March 6-12, but regained their price losses by mid-April. Chicago and other middle-western markets were showing greater strength than eastern consuming centers. Throughout the East and North, a general f. o. b. range of $1.75-$2.00 per 100 pounds prevailed, while the cash-track price of Idaho Russets reached top of $2.50 by April 5. City jobbing sales were mostly within a range of $2.00-$3.00, except that bulk Long Island Green Mountains sold as high as $3.45 in New York City and Idaho stock touched $3.30 in Chicago and $3.60 in Atlanta. Maine was still shipping 1,100 cars weekly and Minnesota 650, with Wisconsin and Idaho approaching 500 cars each. Total movement of old tubers during the opening week of April held around 4,150 cars. Average weeky shipments during March were about 4,500, as against 4,375 in March, 1926.

Active Movement from South

It was thought that cold spells during the growing period would delay the harvesting and shipment of southern new potatoes, but movement has become very active and is fully two weeks earlier than last season. By April 10, early-potato shipments from the Federal Point section in northeastern Florida were about completed, and the Hastings section proper was getting under way. Average stand at Hastings was estimated about 75 per cent; the total yield is expected to average 40 barrels per acre, so that the output may be just about the same as last year in spite of heavier planting. Heavier shipment may occur during the last week of April. Prices of best Spaulding Rose declined rapidly in terminal markets to $7.50-$10.00 per double-head barrel, as weekly movement from Florida increased to 340 cars, compared with 15 cars a year ago. The Rio Grande Valley of Texas originated more than 100 cars the first week of April and f. o. b. prices of sacked Bliss Triumphs declined to $4.00 per 100 pounds. Texas gorwers were receiving only $3.25, which amounts to about $2.00 per bushel, while growers of main-crop potatoes in western New York were getting around $1.00 per bushel. Though acreage in the lower valley of Texas was much increased, average yields are not expected to be so heavy as anticipated at first and total production may be only one-fourth greater than in 1926. Peak shipments from that section were expected by mid-April.

The generally unsettled condition of potato markets in early April was in decided contrast to the situation a year ago. In late March, 1926, highest prices of the season were being obtained for both old and new stock. Florida arrivals were then bringing $17.00-$18.00 per barrel, while northern storage stock

averaged above $5.00 per 100 pounds. At that time last season, the potato market was the strongest it had been in six years.

Outlook for 1927 Season

If potato growers carry out their intentions, as reported on March 1, there may be 3,620,000 acres planted to this crop for harvesting during 1927, which would be about 15% more acreage than in 1926 and 17% more than two years ago. It is possible that this official report of intentions to plant will cause many farmers to change their minds and to be a little more conservative, especially in the late-shipping States. In that event, the actual acreage planted may be considerably reduced from the original intentions and the situation would not be so serious as now appears.

Heaviest increases seem to be intended in the North Central States, particularly in Minnesota, Michigan and Wisconsin. If farmers in the North Central region carry out their purpose to plant 1,622,000 acres of potatoes, they woud have 200,000 acres more than last season and even more than in the big year of 1924. A higher percentage increase over 1926 is indicated for the western States, where 485,000 acres are expected, or nearly 20% more than last year, but the South Central States,—from Kentucky south and southwest to Texas,—look for a gain of almost 27% over the 1926 record, or a total of 334,000 acres. Texas shows a heavier percentage increase than any other State. The South Atlantic region, with 422,000 acres of potatoes, would have a more moderate gain of 13%, and if the North Atlantic group increases its plantings by 11% the acreage there would be 757,000. Maine growers may put out 6% more potatoes than last year, while the increases for New York and Pennsylvania may be 12% and 14%. New Jersey shows a very slight increase over 1926. Taking the State as a whole, Virginia farmers may plant 7% more potatoes than last season, in which case Virginia would rank sixth among all the States as to potato acreage. But the incresaes in the South, except in Florida and Texas, are reported mostly from the non-commercial areas.

Commercial Plantings in Mid-Season States

Growers in eight of the second-early States intend to plant 93,500 acres of potatoes for market this year, as against 86,000 last season and 99,500 two years ago. Net increases and decreases of acreage have been alternating rather regularly in this region, extending fromNew Jersey and Maryland westward to Oklahoma, Kansas and Nebraska. Slight increases of commercial plantings (which are different from total acreage) are reported this year in all the important States in this group. Oklahoma, Arkansas and the Orrick district of Missouri have gained continuously during the last five years, but south-central Nebraska has become almost negligible as a potato center. Growing conditions have been very

favorable, so far, in the Kaw Valley of Kansas, and grading regulations in that section will be more rigid than ever.

Expected Commercial Acreage in Second-Early States, with Comparisons

States	1923 Acres	1924 Acres	1925 Acres	1926 Acres	1927 Acres
Arkansas	2,240	2,500	3,400	4,180	5,560
Kansas (Kaw Valley)	15,700	17,100	16,500	15,800	17,380
Kentucky	5,700	5,680	5,620	5,620	5,340
Maryland (East. Shore)	15,300	15,980	13,150	14,800	15,390
Missouri (Orrick Dist.)	4,100	4,500	4,800	5,000	5,750
Nebr. (Kearney Dist).	5,250	2,000	1,500	800	900
New Jersey	41,100	26,000	40,000	25,650	26,160
Oklahoma	5,580	9,900	14,500	14,400	16,990
Total	94,970	83,660	99,470	86,250	93,470
Previously reported:—					
Early States	186,770	228,390	193,860	230,600	246,870
Total	281,740	312,050	298,330	316,850	340,340

Chicago, Ill.—The old potato deal is riding along on an even keel. We have felt all the time that the stock of potatoes back in the country is not as heavy as most people think. The trade is so pessimistic that no one gets up any enthusiasm over a slight rise in the market.

New potatoes have been **accumulating on track** here for a week and the trade is not showing much enthusiasm. There were 20 cars on track yesterday with only 3 arrivals which shows that the demand is sluggish. Texas grown Triumphs have been jobbing at $4.50 per 100 lb. sack in hundred sack lots. Reports from the south continue to indicate light yields. Many southern shippers claim that their section won't ship any more than they did last year even with an increased acreage.

Indications are for a heavy planting in the Central States. We have had a very heavy seed trade and other dealers report big sales of seed potatoes. It is gratifying to note an increasing demand for and appreciation of field inspected selected seed stock.—**K. P. Bemis, (Albert Miller & Co.) April 8.**

Kansas.—The Kaw Valley has almost finished planting and latest reports are that the acreage is almost 10 per cent heavier than last year. The State Board of Agriculture reports an increase of 12 per cent in acreage for the state as a whole. Practically 100 per cent of the potatoes planted in Shawnee county for commercial purposes were Irish Cobblers. The other counties in the Kaw Valley will run between 90 and 95 per cent Irish Cobblers.

Seed dealers report liberal sales of Semesan Bel. One dealer in Topeka reports the sale of over one thousand pounds. The hot

formaldehyde treatment was used generally outside of the acreage treated with Semesan Bel.

A law making it conpulsory to have carloads of potatoes inspected was enacted at this session of the legislature. This law is aimed to promote better grading and truth in quotations. The results will be watched carefully by other states for it is perhaps the only mid-season district that has compulsory inspection.—**E. A. Stokdyk, Specialist in Marketing. April 4.**

New Jersey.—The potatoes are being planted but it is somewhat early to make any predictions concerning the acreage. In South Jersey the indications are that there will be no increase over last year, whereas in Central Jersey the reports indicate an increase of 10 to 15 per cent. There was a considerable demand for seed this spring and in some cases the dealers were not able to fill all their orders owing to a scarcity of certified seed in the seed-producing sections. Very little non-certified seed was sold this year by any of the Central Jersey dealers. It is questionable if 5 per cent of the crop will be planted with non-certified seed.

A large number of the growers have treated their seed with the organic mercury dip treatments. In some communities all of the seed was treated, whereas in past years, few, if any, of the growers disinfected their seed following the old recommendations. Seed from most of the seed growing sections was in good shape. Very little scab and rhizoctonia was reported but silver scurf was quite prevalent in seed from all sections. Late blight rot was found in seed from one of the northern seed growing sections but was not particularly severe.—**Wm. Martin, April 4.**

New Brunswick, Canada.—Winter weather still prevails. The ice is solid in the Saint John River at Fredericton. The intentions of farmers are to increase the area planted to potatoes fully 20 per cent this year.—**O. C. Hicks, March 28.**

Virginia.—The acreage of early potatoes in Eastern Virginia is about the same as that planted last year. Some contend that the plantings in the two Eastern Shore Counties are slightly less than formerly. Possibly a few growers have consented to plant the front lawn to grass and permitted the housewife to have a small flower garden this year instead of planting every available acre to the lowly spud.

It is expected that the crop planted in February will appear above ground two weeks earlier than last year. Many growers in the Norfolk section have already levelled the ridges thrown over the rows at planting time and the longest sprouts are ready to burst into view within a few days. Although several periods of unfavorable weather have occurred since planting time the seeds pieces have generally escaped injury and very little rotting has been reported.

The bulk of the crop in this section was planted with certified seed purchased last fall from Maine and Prince Edward Island.

The seeds source demonstrations on Eastern Shore have been instrumental in stimulating an interest among the growers in securing the best grade of seed. The Southern Produce members in the Norfolk section have been purchasing cooperatively certified seed for the last five years.

Growers are not expecting exceptionally high prices this season but are hopeful that a fairly strong tone will prevail in the market during the coming season.

Success in the potato game is largely determined by low unit production costs. Fewer acres and better yields per acre should be their slogan. Those growers who persist in expending a considerable sum for seed, fertilizer and insecticides for potato crop planted on unproductive soil cannot expect to reap a profit except occasionally when prices are abnormally high. Since stable manure has become scarce and exhorbitant in price, the trucker must resort to green manural crops for maintaining the organic content of the soil.

At the Virginia Truck Experiment Station the potato yield in 1926 was increased over 100 per cent by the use of green manural crops.—**H. H. Zimmerly, March 24.**

Virginia.—Because of the cool wet weather which has prevailed the past ten days, the potato crop shows no greater development above ground than on March 24th. It is hoped that warm weather will be forthcoming in the near future to force the hidden sprouts above the soil and save the growers fingers, soiled and mutilated by excavating too much to determine the strength of sprouts, amount of rot, etc. A few more days and the local manicurists will either retire for life or die of overwork.

This check in growth will probably prove advantageous at marketing time. Much of the North Carolina crop is well above ground and unless injured by a late frost, should be ready for market several weeks ahead of the Virginia potatoes and thus prevent a glut such as occurred last year.

Considerable damage by rot and maggot injury has been reported in North and South Carolina. Although the acreage planted was 10 per cent greater than that of last year, it is likely that the actual acreage to be harvested is only very slightly greater.—**H. H. Zimmerly, April 4.**

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AMERICAN POTATO JOURNAL

PUBLISHED BY

THE POTATO ASSOCIATION OF AMERICA

WALTER M. PEACOCK EDITOR & BUS. MGR.

108 BALTIMORE AVE., TAKOMA PARK, D.C.

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NOTICE TO NEW YORK MEMBERS

J. Randall Livermore, New York State College of Agriculture, Ithaca, N. Y. is a member of the membership committee and will collect dues and will solicit new members instead of Daniel Dean.

REVIEW OF RECENT LITERATURE

FOLSOM, DONALD.—Die Kartoffelanerkennung in den Vereinigten Staaten von Nordamerika (The certifying of seed potatoes in the U. S. A. Translated title).—*Illustrierte Landwirtschaftliche Zeitung, Vol. 47, p. 43-46. 1927. Berlin, Germany.*

Certification here means the examination, by an official institution or semi-official organization, of a stock of potatoes and its approbation as being specially suitable for seed. It has been developed in the last decade, makes it easier to buy good seed potatoes, and is based upon field records. The value of seed varies with the source, allegedly on account of diffierence in disease content, in environment, and inherent in the stock. In 1925, 21 of the 48 states had certification. In 1923-1925, Maine produced more certified seed than all other states together, although in total potatoes Maine produced only from 5 to 11 per cent. About 1 per cent of the total production of the U. S. A. is certified. A certification agency may be civic, educational, or commercial organization. In different states the rules are different, and the application of the same rule

is different due to climatic masking of symptoms of disease and due to differences in the ability of inspectors to detect diseases. The rules are based on the facts that degeneration diseases are disseminated from diseased to healthy plants in the field and are perpetuated in the tubers, and that certain diseases and varietal admixtures can be recognized most easily, or even solely, in the field of growing plants. Variation from the rules of the State of Maine, which are given as an example, have reference to rotation (needed in Maine to avoid volunteers), isolation, the seed plot as the source of seed, the comparison of samples, preliminary testing of samples, the size of tubers tolerated, and the contents and affixing of tags. A report of results from 11,627 tests conducted in 27 states and 8 Canadian provinces is cited as concluding that certification on the average indicated a larger yield by 46 bushels an acre. Certification increases the price received for seed. It induces benefits through seed improvement even when disqualification occurs. Price-fixing and contact between grower and buyer are problems. More basic scientific facts are needed. Other problems are effective advertising, fraudulent use of genuine tags, imitation tags, and foundation stock. The chief trends are toward making certification a civic inspection service, toward standardization of requirements in each variety, and toward specialization among the various seed- producing regions and among the seed growers of any one region.—**Dr. H. W. Wollenweber, Berlin—Dahlem, Germany.**

SCHLUMBERGER, OTTO.—**Physiologic problems of the potato (wound stimulation).**—***Angewandte Botanik, 1926: 262-274* (Transl. title).**

In this summary of the literature especially on stimulation the author attracts attention to the possible parallelism of stimulation effects with those induced by changing respiration in the plant. Injuries on the skin of potato tubers, whether caused by chance in growing and handling the crop or purposely cutting the seed tuber, may have a lasting effect on the plant. Under certain conditions they are said to influence even ripening, induce quick germination or with other words stimulate in some way further growth. The response of potatoes to such wound stimulation depends both from the physiological condition of the tuber at the time of injury and from environmental influences. A great number of discussions and theoretical reflections give reason to believe that wound stimulation effects are similar to those observed by using stimulants such as salts or gases. Both wound stimulation and metallic salts in very diluted solution facilitate the formation of oxydases and of proteins especially nucleoproteins. **Popoff** pretends that the stimulation is caused by increasing circulation of oxygen in the living molecule. This increasing intramolecular transpiration doubtless exists in the neighbourhood of the zone of stimulation and varies with the same environmental factors that influence stimulation effects, f. i. nutrition, temperature and air humidity. The potato

grower utilizes wound stimulation in inducing quick gerimination for an early crop by cuttng the seed of dormant tubers. Breaking of the dormant stage is also sometimes desirable for diagnostic studies in order to determine doubtful varieties and for quick laboratory tests of tubers on resistance to wart disease.—**H. W. Wollenweber, Berlin,—Dahlem, Germany.**

SCHWEIZER, DR. G. — **Ueber das Vorkommen einiger Xanthinkorper und ihrer Derivate in der Kartoffel (Studies on the occurrence of some xanthins and their derivates in the Irish potato) :—*Arbeit. a. d. Biol. Reichsanstalt f. Land-u. Forstwirtschaft, 15. Bd. 1926, S. 1-18.***

Mosaic, one of the so-called "virus" diseases, is well known on the Irish potato by the peculiar mottling of the leaves, visible with transmitted light as lighter or darker green areas of the parenchyma and characterized also by a more or less slightly roughened surface of the leaves in later stage of the disease. This yellowish green mottling often increases during a period of days with bright sunshine, while it decreases or apparently disappears under rainy, cloudy weather conditions. This peculiarity led Dr. Schander to the idea, if certain uric acid compound (xanthins) might play a part hereby. Dr. Schweizer has followed this suggestion. For the general understanding of his paper a few remarks may be prefaced: From urea, the most important amidderivate of carbonic acid, are derived guanidin, ureids and diureids. The latter contain the group of purins (the basal substance of which is uric acid), the plant—alcaloids coffein and theobromin belonging to their methylated compounds, the xanthins (guanin, adenin, hypoxanthin and xanthin) being their not-methylated compounds. With the aid of ferments, guanin and adenin are said to be transformable into hypoxanthin and xanthin, and the latter two—at least by animals—into uric acid also, which has not yet been proved to occur in plants. Xanthins as substantial parts of the nucleinacid of the nucleus aid in the constitution and circulation of matter in animals (f. i. in liver, milt, brain,muscle tissue, sperma) and in plants (where they have been already found in potatoes, beets, squash, lupine, maple etc.), while methylated xanthins may remain even after their formation in certain plants, so as coffein and theobromin in coffee, thea and cocoa. In employing a special method, Dr. Schweizer succeeded in gaining the xanthins adenin, guanin, hypoxanthin and xanthin in various amounts in yellow-fleshed and other tubers as well as in growing buds of the potato. He also prepared from the potato tuber an oxydising enzyme, which aided in the transformation of parallelism of such transformations in plants and animals. In agreement with the change of the mosaic symptom in leaves of mosaic-diseased plants he found that the gained the xanthin's yellow tint increased after exposure to sun light, but faded out with decreasing light intensity. Investigations on these relations will be continued.—**Dr. H. W. Wollenweber, Berlin, Dahlem.**